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3245-100 13500
USP - 5.7711,391

The
United
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The Commissioner of
Patents and Trademarks

Has received an application for a patent for a new and useful invention. The title and description of the invention are enclosed. The requirements of law have been complied with, and it has been determined that a patent on the invention shall be granted under the law.

Therefore, this

United States Patent

Grants to the person(s) having title to this patent the right to exclude others from making, using, offering for sale, or selling the invention throughout the United States of America or importing the invention into the United States of America for the term set forth below, subject to the payment of maintenance fees as provided by law.

If this application was filed prior to June 8, 1995, the term of this patent is the longer of seventeen years from the date of grant of this patent or twenty years from the earliest effective U.S. filing date of the application, subject to any statutory extension.

If this application was filed on or after June 8, 1995, the term of this patent is twenty years from the U.S. filing date, subject to any statutory extension. If the application contains a specific reference to an earlier filed application or applications under 35 U.S.C. 120, 121 or 365(c), the term of the patent is twenty years from the date on which the earliest application was filed, subject to any statutory extension.

Bruce Lehman

Commissioner of Patents and Trademarks

Pandra Morton

Attest



US005777391A

United States Patent [19]

Nakamura et al.

[11] **Patent Number:** 5,777,391[45] **Date of Patent:** Jul. 7, 1998

[54] **SEMICONDUCTOR DEVICE HAVING AN IMPROVED CONNECTION ARRANGEMENT BETWEEN A SEMICONDUCTOR PELLET AND BASE SUBSTRATE ELECTRODES AND A METHOD OF MANUFACTURE THEREOF**

5,442,231 8/1995 Miyamoto et al. 257/784
 5,519,251 5/1996 Sato et al. 257/778
 5,677,566 10/1997 King et al. 257/778
 5,684,330 11/1997 Lee 257/778

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Nikkei electronics 1994.2.28 (No. 602), pp. 111-117. (with translation).

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[21] **Appl. No.:** 570,646

[22] **Filed:** Dec. 11, 1995

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[51] **Int. CL⁶** H01L 23/49

[52] **U.S. CL.** 257/778; 257/777; 257/780;
 257/737; 257/784; 438/108; 438/617

[58] **Field of Search** 257/780, 777,
 257/778, 737, 738, 697, 784; 438/108,
 617

[56] **References Cited****U.S. PATENT DOCUMENTS**

5,107,328 4/1992 Kinsman 257/784
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[57] **ABSTRACT**

A semiconductor device comprising a semiconductor pellet mounted on a pellet mounting area of the main surface of a base substrate, in which first electrode pads arranged on the back of the base substrate are electrically connected to bonding pads arranged on the main surface of the semiconductor pellet. The base substrate is formed of a rigid substrate, and its first electrode pads are electrically connected to the second electrode pads arranged on its reverse side. The semiconductor pellet is mounted on the pellet mounting area of the main surface of the base substrate, with its main surface downward, and its bonding pads are connected electrically with the second electrode pads of the base substrate through bonding wires passing through slits formed in the base substrate.

25 Claims, 13 Drawing Sheets